



Basic epidemiology of wellbeing among children and adolescents: A cross-sectional population level study

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ABSTRACT

Wellbeing and mental health are fundamental rights of children and adolescents essential for sustainable development. Understanding the epidemiology of child and adolescent wellbeing is essential to informing population health approaches to improving wellbeing and preventing mental illness. The present study estimated the prevalence of wellbeing and how wellbeing indicators were distributed across social and economic groups. This study used data from the 2019 Wellbeing and Engagement Collection; an annual census conducted in South Australian schools that measures self-reported wellbeing in students aged 8–18 years ($n = 75,966$). We estimated the prevalence ($n, \%$) of low, medium and high wellbeing across five outcomes: life satisfaction, optimism, sadness, worries and happiness, overall and stratified by gender, age, language background, socio-economic position and geographical remoteness. The prevalence of low wellbeing on each indicator was: happiness 13%, optimism 16%, life satisfaction 22%, sadness 16% and worries 25%. The prevalence of low wellbeing increased with age, particularly for females. For example, 22.5% of females aged 8–10 years had high levels of worries compared to 43.6% of 15 to 18-year old females. Socioeconomic inequality in wellbeing was evident on all indicators, with 19.5% of children in the most disadvantaged communities having high levels of sadness compared to 12.5% of children in the most advantaged communities. Many children and adolescents experience low wellbeing on one or more indicators (40.7%). The scale of this problem warrants a population-level preventative health response, in addition to a clinical, individual-level responses to acute mental health needs. Universal school-based programs that support social and emotional wellbeing have a role to play in this response but need to be supported by universal and targeted responses from outside of the education system.

1. Introduction

The United Nations Convention on the Rights of the Child states every child has the right not only to survive, but to live to their fullest potential, developing healthily in conditions that do not adversely affect their physical and mental wellbeing (Office of the United Nations of High Commissioner for Human Rights, 1989). Healthy child development includes social and emotional wellbeing (sometimes referred to as non-cognitive skills, subjective wellbeing or character traits), which is not simply absence of mental ill-health but the flourishing of positive mental traits (Keyes & Martin, 2017). Recognition of the importance of

individual's subjective wellbeing, in addition to their mental health, has increased ever since the Stiglitz Commission recommended that social progress should be measured using subjective wellbeing indicators (Stiglitz, Sen, & Fitoussi, 2009). Specifically, the need to measure and prioritise subjective wellbeing in children has been emphasized, given the long-term impacts of wellbeing on academic, social, emotional, and economic outcomes (Casas, 2011; Conti & Heckman, 2012; Flèche, Lekfuangfu, & Clark, 2021; Suldo, Thalji, & Ferron, 2011).

More recently, the United Nations Sustainable Development Goals (SDGs) highlighted promoting healthy lives and wellbeing at all ages to be essential for sustainable development. By 2030, member countries

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committed to reducing premature mortality from non-communicable diseases by one third, as outlined by target 3.4 (United Nations General Assembly, 2015) through the prevention, treatment and promotion of mental health and wellbeing. Health, wellbeing and sustainable development are interconnected, with health and wellbeing both a precursor to as well as an outcome of successful sustainable development (Nunes, Lee, & Riordan, 2016). Specifically, child and adolescent mental health and wellbeing contribute to several SDGs, including those related to gender equity, education, work, and economic growth, as well as reduced inequalities. Supporting optimal social and emotional wellbeing among children and adolescents is essential in achieving progress toward the broader Sustainable Development Agenda. The Organisation for Economic Co-operation and Development (OECD) have supported this call to action arguing “children need a balanced set of cognitive, social and emotional skills in order to succeed in modern life” (OECD, 2015).

Childhood and adolescence are critical developmental periods to promote psychological wellbeing and reduce risk for mental disorders. Disruptions to mental health and wellbeing in childhood and adolescence are associated with a range of adverse outcomes, including reductions in school engagement (Knollmann, Reissner, & Hebebrand, 2019) and academic success (Suldo et al., 2011), and vulnerability to mental disorders across the lifespan (Kessler et al., 2005). Conversely, positive wellbeing in childhood and adolescence can protect against stressful life events, psychopathology and adverse psychosocial outcomes (Bethell, Jones, Gombojav, Linkenbach, & Sege, 2019). For example, positive engagement with family, friends, teachers and the community in childhood are associated with better social and emotional outcomes and lower odds of poor mental health in adulthood, even after controlling for adverse childhood experiences (Bethell et al., 2019).

Understanding the epidemiology of child and adolescent wellbeing is central to informing population health approaches to improving psychosocial outcomes and preventing poor mental health. In schools, emerging policy and programming initiatives are moving beyond risk screening and towards cultivating resilience and psychological strengths (Ager, 2013). Such approaches align with “complete state” models of mental health that take into account positive aspects of functioning such as happiness, life satisfaction and optimism, as well as negative dimensions such as sadness, distress and worry (Keyes & Martin, 2017). There is a need to understand the prevalence of the multiple facets of child and adolescent wellbeing and how these indicators are distributed across social and economic groups to gain a comprehensive understanding of child and adolescent wellbeing at a population level.

Studies exploring age patterns in child and adolescent wellbeing have generally found a decline in emotional wellbeing from childhood to adolescence (Casas & González-Carrasco, 2019), although these effects are often small. For example, a recent large-scale study of 9–14 year olds from 14 countries who participated in the Children’s Worlds study found a weak, negative association ($r = -0.07$) between age and life satisfaction (Newland et al., 2019). With respect to gender, girls tend to report poorer psychological wellbeing than boys, and these differences are more pronounced in adolescence than childhood (Patalay & Fitzsimons, 2018). Socioeconomic gradients in psychological wellbeing have been found across the globe, with larger gaps observed in countries such as the United States and United Kingdom with more income inequality, than in countries such as Australia, Canada and Denmark (Loft & Waldfogel, 2020). Indeed, there is some evidence that socioeconomic inequalities in psychological wellbeing may be larger than those in physical health. For example, a study of children from 34 countries who participated in the Health Behaviour in School-aged Children (HBSC) study, found large socioeconomic inequalities for emotional wellbeing indicators (life satisfaction and psychological symptoms) with smaller inequalities seen in physical health outcomes (physical symptoms, body mass index) (Elgar et al., 2015).

Limitations of existing child and adolescent wellbeing research include (1) predominance of adult-report rather than child-report

measures of wellbeing; (2) reliance on a small number of wellbeing indicators; (3) neglect of positive dimensions of wellbeing, and (4) a focus on child wellbeing during a narrow age range. Although research studies, such as the HSBC (Elgar et al., 2015) and the Children’s Worlds study (Casas & González-Carrasco, 2019), have addressed some of these limitations, one area that remains limited is population-wide, child and adolescent wellbeing data. Population-wide data provides information on small subgroups including vulnerable children who are often less likely to participate in research studies, helping to inform effective policy-making and intervention strategies to improve the wellbeing of all children and young people. A recent OECD report noted that regular data collections that capture information on the wellbeing of children across a wide age range and include children from vulnerable groups are essential for policy monitoring purposes (OECD, 2021). The report also highlighted the importance of giving children the opportunity to report on their own views and perspectives, in line with the United Nations Convention on the Rights of Children. High quality, regular population monitoring provides a mechanism to track progress towards local, national, and international goals and targets, such as the Sustainable Development Goals.

The South Australian Wellbeing and Engagement Collection (WEC) is an annual census that captures child self-reported wellbeing among 8–18 year old school students, using validated, multi-item scales measuring multiple dimensions of positive and negative wellbeing (T. Gregory & Brinkman, 2020). The WEC is one of the largest population monitoring systems of child and adolescent wellbeing in the world, and its scale continues to expand each year (T. Gregory et al., 2021). The present study utilises 2019 WEC data to estimate the prevalence of wellbeing and quantifies differences across social and economic groups.

2. Method

2.1. Data

This study used data from the 2019 WEC, which was conducted by the South Australian Department for Education (DfE) in Term 1 (March/April 2019). All schools in South Australia were invited to participate, and children in Grade 4 to 12 were eligible to take part in the collection. A total of 96,841 children and adolescents from 522 schools participated in the 2019 WEC. School-level participation was 89% in public/government, 52% in Catholic schools and 19% in Independent schools (T. Gregory & Brinkman, 2020; T. Gregory et al., 2021). Data for government school students were able to be linked to school enrolment census data, providing indicators of socio-demographic characteristics. As such, results presented are limited to government school students only. Ethics approval was received from the University of Western Australia (RA/4/20/6095). Data linkage was conducted by the South Australian DfE who provided a de-identified data file to the researchers for analysis.

2.2. Sample

The eligible study population (see Fig. 1) were defined as all government (public) school students in Grade 4 to 12 aged ≤ 18 years old ($n = 117,366$). A total of 76,939 students (65.6% of eligible sample) completed the WEC. A small number of these children ($n = 973$, 0.8%) were excluded because they did not complete enough survey items (see Supplementary Table S1 for socio-demographic characteristics of these children). The final analysis sample included 75,966 Grade 4 to 12 students, aged 8–18 years who were enrolled in school at the February 2019 school enrolment census and had valid WEC data. Children with missing data on socio-demographic variables and/or wellbeing outcomes were retained in the analysis sample, with missing data accounted for via imputation methods (see Data Analysis section).

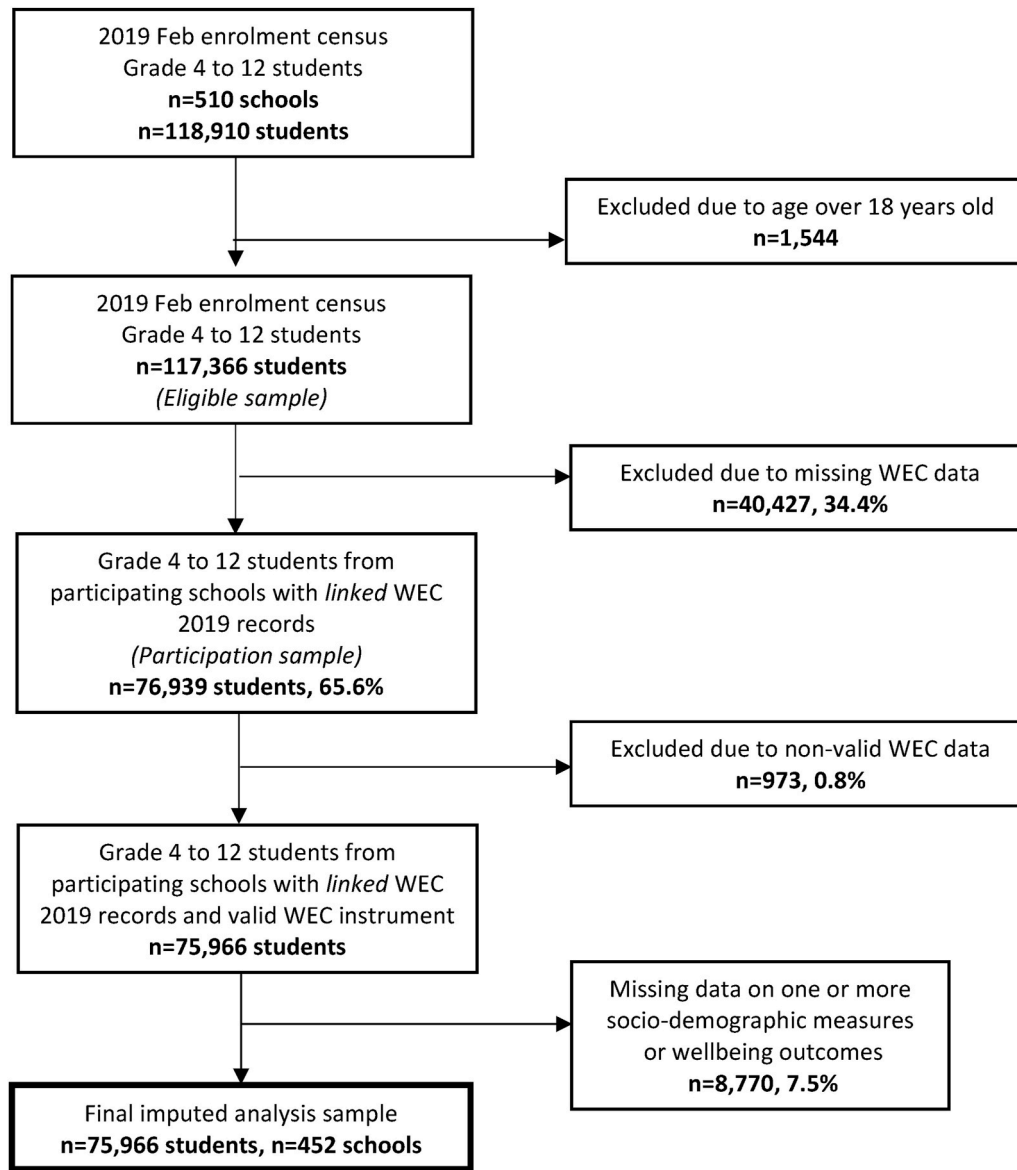


Fig. 1. Flow chart of sample selection from eligible study population.

Table 1
Social and emotional wellbeing measures.

	Items	Internal reliability ^a	Example items	Source of original scale
Life satisfaction	5	.84 to .89	So far I have gotten the important things I want in life The things in my life are excellent	<i>Satisfaction with Life Scale – Adapted for Children</i> (Gadermann, Schonert-Reichl, & Zumbo, 2010)
Optimism	3	.75 to .83	I start most days thinking I will have a good day I have more good times than bad times	<i>Resiliency Inventory Subscale</i> (Noam & Goldstein, 1998) <i>Middle Years Development Instrument</i> (Schonert-Reichl et al., 2013)
Happiness	4	.76 to .87	I feel happy I am a cheerful person	<i>EPOCH Measure of Adolescent Wellbeing</i> (Kern, Benson, Steinberg, & Steinberg, 2015)
Sadness	3	.74 to .86	I feel unhappy a lot of the time I feel that I do things wrong a lot	<i>Seattle Personality Questionnaire for young school-aged children</i> (Kusche, Greenberg, & Beilke, 1988) <i>Middle Years Development Instrument</i> (Schonert-Reichl et al., 2013)
Worries	4	.82 to .87	I worry a lot about things at home I worry a lot about things at school	<i>Wellbeing and Engagement Collection</i> (T. Gregory & Brinkman, 2020)

Notes. ^a Internal reliability (Cronbach's alpha) was calculated separately for children in different grade levels (1) Grade 4–5, (2) Grade 6–7, (3) Grade 8–9 and (4) Grade 10–12, and the range of values are presented here. This information is presented with permission from Gregory and Brinkman (2020).

2.3. Measures

2.3.1. Social and emotional wellbeing outcomes

The five, multi-item scales measuring social and emotional wellbeing were; life satisfaction, optimism, happiness, sadness, and worries. Most scales were adapted from other instruments (see Table 1 for details). Validity studies have established that each of the scales have good internal reliability with primary and secondary school students (T. Gregory & Brinkman, 2020). Each item was answered on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree), and items within each scale were averaged to create a scale score from 1 to 5. Three of the five scales were adapted from the Middle Years Development Instrument (Schonert-Reichl et al., 2013) and following their approach, scale scores were recoded into three categories: “low” (<3), “medium” (≥3 and < 4), or “high” (≥4), and these categorical variables served as the outcomes for all analyses.

2.3.2. Socio-demographics

Socio-demographic characteristics of students sourced from the school enrolment census included school grade, age, language background (English only/non-English speaking background), postcode (i.e. zip/area code) of residence and highest level of formal education of parent/guardian. Child gender was based on a self-reported item in the WEC survey (male, female or other), or school enrolment records where this was missing. Community level socioeconomic status and geographical remoteness were assigned to each student based on their postcode of residence. The 2016 Socio-Economic Indexes for Areas Index of Relative Socio-Economic Advantage and Disadvantage (SEIFA IRSAD) (Australian Bureau of Statistics, 2016b) provided an area level measure of socioeconomic status, ranging from Quintile 1 (most disadvantaged) to Quintile 5 (most advantaged). The 2016 Accessibility and Remoteness Index of Australia (ARIA) (Australian Bureau of Statistics, 2016a) was used as an indicator of geographical remoteness, with categories ranging from Major Cities to Remote/Very Remote communities.

2.4. Statistical analysis

We estimated the prevalence of low, medium and high wellbeing across each of the five wellbeing outcomes: life satisfaction, optimism, sadness, worries and happiness. Descriptive statistics (n and %) were calculated for each outcome. To investigate the distribution of wellbeing across socio-demographic groups, we stratified analyses by gender, age, language background, socio-economic position (community and family level) and geographical remoteness. In addition, prevalence by age was explored separately for male and female students.

2.4.1. Missing data

In the analysis sample (n = 75,966), 7.5% of students (n = 8770) had missing data on one or more wellbeing outcomes or socio-demographic variables. For wellbeing outcomes, this ranged from 2.7% for happiness (n = 2077) to 4.4% for life satisfaction (n = 3351). For socio-demographic variables this ranged from 0.4% for geographical remoteness to 3.0% for parental education level (n = 2302). To account for potential bias arising from missing data on these variables we conducted multiple imputation for our analysis sample using all outcomes and socio-demographics, with the addition of auxiliary variables hypothesised to improve the prediction of missingness on our study variables (highest level of parental occupation, financial assistance with school fees (school card scheme), student under the guardianship of the minister following child protection concerns, refugee background and disability status). We conducted multiple imputation by chained equations using the *mi impute chained* command in Stata SE version 16 (StataCorp, 2019), with 20 imputed datasets, and a burn-in of 30 iterations. The results of the overall prevalence and stratified analysis did not differ substantially between the complete case analysis and the imputed results. As such we present the imputed results only.

3. Results

Table 2 presents the socio-demographic characteristics of the eligible population (i.e. all Grade 4 to 12 students aged ≤18 years) and the analysis sample. The most pronounced differences between the analysis sample and eligible population were in grade level and age, reflecting lower participation rates in the WEC amongst older students (T. Gregory et al., 2021). For example, Grade 4 to 5 students made up 24.7% of the eligible population and 27.9% of the analysis sample. Conversely, Grade 10 to 12 students made up 31.2% of the eligible sample and 23.6% of the analysis sample. There was some bias in the WEC analysis sample with children from more socio-economically disadvantaged backgrounds under-represented. Specifically, the percentage of students living in the most socioeconomically disadvantaged communities was slightly lower in the analysis sample compared to the eligible population (26.1% vs 29.0%), and the percentage of children with parents/guardians with a Bachelor Degree or above was slightly higher in the analysis sample than the eligible cohort (31.9% vs 28.2%). As a result, the prevalence data reported below are likely to under-represent the wellbeing of children from the most socio-economically disadvantaged backgrounds.

Table 3 presents the prevalence of low, medium and high levels of life satisfaction, optimism, happiness, sadness, and worries. For the positive wellbeing indicators most children had high wellbeing (41.3% for life satisfaction, 48.4% for optimism, 55.3% for happiness), about a

Table 2
Socio-demographic characteristics of analysis sample and eligible sample.

Socio-demographic characteristics		Analysis sample	Eligible sample
		(n = 75, 966)	(n = 117, 366)
		N (%)	N (%)
Gender	Male	38,361 (50.5)	60,268 (51.4)
	Female	36,984 (48.7)	56,465 (48.1)
	Other	621 (0.8)	633 (0.5)
Grade level	4–5	21,177 (27.9)	28,976 (24.7)
	6–7	20,125 (26.5)	27,287 (23.2)
	8–9	16,715 (22.0)	24,450 (20.8)
	10–12	17,949 (23.6)	36,653 (31.2)
Age	8–10 years old	22,368 (29.4)	30,474 (26.0)
	11–12 years old	19,848 (26.1)	27,008 (23.0)
	13–14 years old	16,453 (21.7)	24,212 (20.6)
	15–18 years old	17,297 (22.8)	35,672 (30.4)
Language background	English only	57,976 (76.3)	89,822 (76.5)
	NESB	17,990 (23.7)	27,544 (23.5)
Community socio-economic position (SEIFA IRSAD)	1 (Most disadvantaged)	19,844 (26.1)	34,005 (29.0)
	2	12,608 (16.6)	19,357 (16.5)
	3	11,976 (15.8)	18,511 (15.8)
	4	15,673 (20.6)	22,568 (19.2)
	5 (Most advantaged)	15,865 (20.9)	21,932 (18.7)
Highest education level of parents	Missing	0 (0.0)	993 (0.8)
	Year 11 or equivalent or below	10,001 (13.2)	17,113 (14.6)
level of parents	Year 12 or equivalent	8987 (11.8)	14,080 (12.0)
	Certificate I to IV	21,866 (28.8)	32,583 (27.8)
	Advanced Diploma or Diploma	10,892 (14.3)	15,956 (13.6)
	Bachelor Degree or above	24,220 (31.9)	33,097 (28.2)
Geographical remoteness (ARIA)	Missing	0 (0.0)	4537 (3.9)
	Major Cities of Australia	52,808 (69.5)	80,101 (68.2)
remoteness (ARIA)	Inner Regional Australia	11,120 (14.6)	17,068 (14.5)
	Outer Regional Australia	9405 (12.4)	14,782 (12.6)
	Remote/Very Remote Australia	2633 (3.5)	4439 (3.8)
	Missing	0 (0.0)	976 (0.8)

Note. NESB = Non-English Speaking Background; SEIFA IRSAD = Socio-Economic Indexes for Areas - Index of Relative Socio-Economic Advantage and Disadvantage. ARIA = Accessibility and Remoteness Index of Australia.

Table 3
Prevalence of emotional wellbeing outcomes (n = 75, 966).

	Low N (%)	Medium N (%)	High N (%)
<i>Life satisfaction</i>	16,545 (21.8)	28,053 (36.9)	31,368 (41.3)
<i>Optimism</i>	12,115 (15.9)	27,093 (35.7)	36,758 (48.4)
<i>Happiness</i>	9632 (12.7)	24,303 (32.0)	42,031 (55.3)
<i>Sadness</i>	40,016 (52.7)	23,797 (31.3)	12,153 (16.0)
<i>Worries</i>	31,187 (41.1)	25,647 (33.8)	19,132 (25.2)

third of the sample were in the medium category, and less than a quarter had low wellbeing (12.7% for happiness, 15.9% for optimism, 21.8% for life satisfaction). With respect to the negative wellbeing indicators, most children had low levels of sadness (52.7%) and worries (41.1%) but a sizable proportion reported high levels of sadness (16.0%) or worries (25.2%). Taken together, 40.7% of children had low wellbeing on one or more of the five wellbeing indicators (i.e. low life satisfaction/optimism/happiness, or high sadness/worries).

Tables 4 and 5 present the distribution of positive (life satisfaction, optimism, and happiness) and negative (sadness and worries) wellbeing outcomes across socio-demographic groups. Females reported lower wellbeing than males (Table 4). For example, 24.5% of female students had low life satisfaction compared with 18.7% of males. While it should be interpreted with caution due to small numbers, a high percentage of students who selected “other” gender reported having low life satisfaction (48.6%), with similar patterns observed for optimism and happiness.

The prevalence of low life satisfaction, optimism and happiness all increased with age, with 15–18 year old students about two times more likely to report low wellbeing than 8–10 year olds, and this age gradient was steeper for females than males (see Fig. 2). For example, the prevalence of low life satisfaction increased from 14.6% for male and 14.4% for female students aged 8–10 years old to 25.9% for males and 36.7% for females aged 15–18 years. Small differences in the wellbeing of students according to language background were observed, with fewer students from a non-English speaking background reporting low wellbeing compared to their peers who spoke English only.

A socio-economic gradient in the positive wellbeing indicators was evident at both the community and family level. Students living in the most disadvantaged communities had a lower prevalence of high wellbeing compared to students in the most advantaged communities (Fig. 3). For example, 50.2% of children living in the most disadvantaged communities reported high levels of happiness compared to 60.8% of children living in the most advantaged communities. Similar patterns were observed in terms of parental education, with the children of more educated parents more likely to report high levels of life satisfaction, optimism and happiness. Wellbeing did not vary markedly for children living in more or less geographically remote areas of the state.

Patterns of sociodemographic differences for the negative wellbeing indicators (sadness and worries) were similar to those identified for the positive wellbeing indicators. Compared to male students, female students had higher levels of sadness (19.3% vs. 12.4%) and worries (30.6% vs. 19.7%) with even higher percentages observed for students who selected other gender. Older students were more likely than younger students to report high levels of sadness and worries, and this age gradient was steeper for females than males. For example, the prevalence of high worries increased slightly for male students from 19.7% (8–10 years) to 22.0% (15–18 years) but increased markedly for females from 22.5% (8–10 years) to 43.6% (15–18 years).

A socio-economic gradient in both sadness and worries was evident at both the community and family level. A slightly higher percentage of children living in inner and outer regional communities had high levels of sadness (17.0% and 17.5%) compared with children living in major cities (15.6%), with even lower levels of sadness observed for children living in remote and very remote communities (14.7%). Little variation

in worries was observed between children and adolescents living in more and less geographically remote areas.

4. Discussion

While many studies have explored the wellbeing of children and adolescents, few studies have used large, population-based datasets to understand wellbeing across a wide age range using self-reported measures. The present study estimated the prevalence of child and adolescent wellbeing using multiple positive and negative wellbeing indicators to understand how these are distributed across social and economic groups. The results provide schools, researchers, policy makers and governments with a comprehensive understanding of the epidemiology of child and adolescent wellbeing. Our study found that a significant proportion of children and adolescents are experiencing poor wellbeing during their schooling years, with low levels of optimism (16%), happiness (13%) or life satisfaction (22%), and/or high levels of sadness (16%) or worries (25%). Overall, a total of 40.7% of children and adolescents had low wellbeing on one or more of these indicators. A prevalence of this scale requires more than clinical-based, individual level responses that are traditionally utilised to treat mental illness but a population-level preventative health approach (Fazel & Hoagwood, 2021).

Consistent with previous research (Patalay & Fitzsimons, 2018), females were more likely to have poor wellbeing than males across all indicators. About 20% of male students reported high levels of worries compared to 31% of female students, with similar patterns for other wellbeing indicators. A recent study of gender gaps in 73 countries found that adolescent females (15 years of age) had poorer life satisfaction and experienced more psychological distress than males in almost all countries (Campbell, Bann, & Patalay, 2021). Larger gender gaps were observed in more gender equal societies, such as Scandinavia, than in countries such as Jordan, Saudi Arabia and Lebanon. The authors posit that in more gender equal societies girls and women have more opportunity for educational attainment and economic participation but are often still expected to maintain traditional roles and responsibilities at home and this role conflict, as well as a higher workload may be one factor contributing to poorer wellbeing amongst adolescent females. Our study also found that students who selected “other” gender had worse wellbeing than both male and female students. While not a focus of this paper, the wellbeing of children and adolescents who identify as non-binary or transgender is an important research area and better classification of gender identity within the WEC would help further this research.

Also consistent with previous studies (Elgar et al., 2015; Loft & Waldfogel, 2020) there was a clear socio-economic gradient in both positive and negative wellbeing indicators with children living in more socio-economically disadvantaged communities or having less educated parents having poorer wellbeing. There are multiple mechanisms through which socio-economic disadvantage might negatively impact children’s social and emotional wellbeing. For example, children growing up in more disadvantaged communities are at a higher risk of experiencing adverse childhood events including financial hardship, parental mental illness, divorce, substance abuse and domestic violence (Walsh, McCartney, Smith, & Armour, 2019), which have been shown to have negative impacts on children’s mental health and wellbeing (Balistreri & Alvira-Hammond, 2016; Bomysoad & Francis, 2020). Given the marked socio-economic gradients in wellbeing identified in the current and previous studies, it is important for evaluations of wellbeing programs to determine their equity of impact, as well as their overall impact.

Contrary to previous research suggesting a small association between age and wellbeing in children and adolescents (Newland et al., 2019), our analyses found the prevalence of low wellbeing increased markedly with age on both positive and negative wellbeing outcomes. The wider age range of children in the current study (8–18 years) compared with

Table 4
Prevalence of positive wellbeing indicators by socio-demographics (n = 75, 966).

	Life satisfaction			Optimism			Happiness		
	Low	Medium	High	Low	Medium	High	Low	Medium	High
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Gender									
Male	7188 (18.7)	14,199 (37.0)	16,974 (44.2)	5522 (14.4)	13,367 (34.8)	19,472 (50.8)	4352 (11.3)	12,052 (31.4)	21,958 (57.2)
Female	9056 (24.5)	13,663 (36.9)	14,265 (38.6)	6327 (17.1)	13,516 (36.5)	17,141 (46.3)	5042 (13.6)	12,050 (32.6)	19,892 (53.8)
Other	302 (48.6)	190 (30.7)	129 (20.7)	266 (42.8)	210 (33.7)	146 (23.5)	238 (38.3)	202 (32.5)	181 (29.1)
Age									
8–10 years old	3258 (14.6)	7091 (31.7)	12,019 (53.7)	2582 (11.5)	6340 (28.3)	13,446 (60.1)	1789 (8.0)	6215 (27.8)	14,365 (64.2)
11–12 years old	3670 (18.5)	6943 (35.0)	9236 (46.5)	2769 (14.0)	6766 (34.1)	10,313 (52.0)	2134 (10.7)	5838 (29.4)	11,877 (59.8)
13–14 years old	4181 (25.4)	6647 (40.4)	5625 (34.2)	3123 (19.0)	6599 (40.1)	6731 (40.9)	2525 (15.3)	5699 (34.6)	8229 (50.0)
15–18 years old	5437 (31.4)	7373 (42.6)	4488 (25.9)	3641 (21.0)	7387 (42.7)	6269 (36.2)	3185 (18.4)	6552 (37.9)	7560 (43.7)
Gender x Age									
Males 8–10 years old	1650 (14.6)	3573 (31.7)	6058 (53.7)	1446 (12.8)	3212 (28.5)	6623 (58.7)	1032 (9.2)	3268 (29.0)	6980 (61.9)
Males 11–12 years old	1578 (15.8)	3481 (34.8)	4937 (49.4)	1223 (12.2)	3371 (33.7)	5402 (54.0)	928 (9.3)	2996 (30.0)	6072 (60.7)
Males 13–14 years old	1686 (20.3)	3326 (40.0)	3295 (39.7)	1287 (15.5)	3174 (38.2)	3846 (46.3)	1050 (12.6)	2735 (32.9)	4523 (54.4)
Males 15–18 years old	2274 (25.9)	3820 (43.5)	2683 (30.6)	1567 (17.9)	3610 (41.1)	3600 (41.0)	1342 (15.3)	3052 (34.8)	4383 (49.9)
Females 8–10 years old	1581 (14.4)	3485 (31.7)	5933 (53.9)	1108 (10.1)	3099 (28.2)	6793 (61.8)	734 (6.7)	2921 (26.6)	7345 (66.8)
Females 11–12 years old	2026 (20.9)	3423 (35.3)	4259 (43.9)	1484 (15.3)	3352 (34.5)	4871 (50.2)	1152 (11.9)	2802 (28.9)	5754 (59.3)
Females 13–14 years old	2392 (30.1)	3259 (41.0)	2302 (28.9)	1748 (22.0)	3356 (42.2)	2849 (35.8)	1400 (17.6)	2896 (36.4)	3657 (46.0)
Females 15–18 years old	3056 (36.7)	3496 (42.0)	1771 (21.3)	1986 (23.9)	3709 (44.6)	2627 (31.6)	1756 (21.1)	3432 (41.2)	3136 (37.7)
Language background									
English only	13,283 (22.9)	21,119 (36.4)	23,575 (40.7)	9938 (17.1)	20,967 (36.2)	27,070 (46.7)	7830 (13.5)	18,554 (32.0)	31,592 (54.5)
NESB	3263 (18.1)	6934 (38.5)	7793 (43.3)	2176 (12.1)	6126 (34.1)	9688 (53.9)	1802 (10.0)	5749 (32.0)	10,439 (58.0)
Community socio-economic position (SEIFA IRSAD)									
1 (Most disadvantaged)	4863 (24.5)	7175 (36.2)	7807 (39.3)	3680 (18.5)	7090 (35.7)	9075 (45.7)	3075 (15.5)	6810 (34.3)	9959 (50.2)
2	2977 (23.6)	4609 (36.6)	5022 (39.8)	2163 (17.2)	4491 (35.6)	5954 (47.2)	1726 (13.7)	4035 (32.0)	6847 (54.3)
3	2677 (22.4)	4575 (38.2)	4724 (39.4)	1954 (16.3)	4385 (36.6)	5637 (47.1)	1591 (13.3)	3947 (33.0)	6438 (53.8)
4	3117 (19.9)	5812 (37.1)	6744 (43.0)	2244 (14.3)	5524 (35.2)	7905 (50.4)	1729 (11.0)	4804 (30.7)	9140 (58.3)
5 (Most advantaged)	2911 (18.3)	5883 (37.1)	7070 (44.6)	2074 (13.1)	5603 (35.3)	8188 (51.6)	1510 (9.5)	4707 (29.7)	9647 (60.8)
Highest education level of parents/guardians									
Year 11 or equivalent or below	2613 (26.1)	3699 (37.0)	3689 (36.9)	2029 (20.3)	3595 (35.9)	4378 (43.8)	1675 (16.8)	3517 (35.2)	4809 (48.1)
Year 12 or equivalent	2127 (23.7)	3378 (37.6)	3482 (38.7)	1536 (17.1)	3386 (37.7)	4065 (45.2)	1280 (14.2)	2978 (33.1)	4730 (52.6)
Certificate I to IV	5001 (22.9)	8002 (36.6)	8863 (40.5)	3789 (17.3)	7912 (36.2)	10,165 (46.5)	3012 (13.8)	7115 (32.5)	11,739 (53.7)
Advanced Diploma or Diploma	2369 (21.8)	4037 (37.1)	4486 (41.2)	1731 (15.9)	3952 (36.3)	5208 (47.8)	1358 (12.5)	3479 (31.9)	6055 (55.6)
Bachelor Degree or above	4435 (18.3)	8937 (36.9)	10,848 (44.8)	3030 (12.5)	8248 (34.1)	12,942 (53.4)	2307 (9.5)	7215 (29.8)	14,698 (60.7)
Geographical remoteness (ARIA)									
Major Cities of Australia	11,339 (21.5)	19,599 (37.1)	21,871 (41.4)	8241 (15.6)	18,840 (35.7)	25,727 (48.7)	6528 (12.4)	16,845 (31.9)	29,436 (55.7)
Inner Regional Australia	2564 (21.3)	4107 (36.9)	4450 (40.0)	1894 (17.0)	4067 (36.6)	5159 (46.4)	1474 (13.3)	3629 (32.6)	6018 (54.1)
Outer Regional Australia	2108 (22.4)	3339 (35.5)	3958 (42.1)	1587 (16.9)	3261 (34.7)	4557 (48.5)	1316 (14.0)	3031 (32.2)	5057 (53.8)
Remote/Very Remote Australia	535 (20.3)	1009 (38.3)	1090 (41.4)	393 (14.9)	926 (35.2)	1314 (49.9)	314 (11.9)	799 (30.3)	1520 (57.7)

Table 5
Prevalence of negative wellbeing indicators by socio-demographics (n = 75, 966).

	Sadness			Worries		
	Low	Medium	High	Low	Medium	High
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
<i>Gender</i>						
Male	22,158 (57.8)	11,442 (29.8)	4761 (12.4)	18,074 (47.1)	12,738 (33.2)	7550 (19.7)
Female	17,669 (47.8)	12,163 (32.9)	7152 (19.3)	12,935 (35.0)	12,727 (34.4)	11,323 (30.6)
Other	190 (30.5)	192 (30.8)	240 (38.6)	178 (28.7)	182 (29.4)	260 (41.9)
<i>Age</i>						
8–10 years old	13,293 (59.4)	6273 (28.0)	2802 (12.5)	10,802 (48.3)	6846 (30.6)	4719 (21.1)
11–12 years old	11,297 (56.9)	5868 (29.6)	2683 (13.5)	9053 (45.6)	6418 (32.3)	4377 (22.1)
13–14 years old	8209 (49.9)	5399 (32.8)	2845 (17.3)	6309 (38.3)	5773 (35.1)	4371 (26.6)
15–18 years old	7218 (41.7)	6256 (36.2)	3823 (22.1)	5023 (29.0)	6609 (38.2)	5665 (32.7)
<i>Gender x Age</i>						
Males 8–10 years old	6765 (60.0)	3188 (28.3)	1328 (11.8)	5674 (50.3)	3384 (30.0)	2223 (19.7)
Males 11–12 years old	6132 (61.3)	2776 (27.8)	1089 (10.9)	5001 (50.0)	3143 (31.4)	1852 (18.5)
Males 13–14 years old	4846 (58.3)	2486 (29.9)	975 (11.7)	3978 (47.9)	2786 (33.5)	1543 (18.6)
Males 15–18 years old	4416 (50.3)	2993 (34.1)	1369 (15.6)	3422 (39.0)	3424 (39.0)	1931 (22.0)
Females 8–10 years old	6492 (59.0)	3058 (27.8)	1450 (13.2)	5096 (46.3)	3432 (31.2)	2472 (22.5)
Females 11–12 years old	5116 (52.7)	3043 (31.3)	1550 (16.0)	4006 (41.3)	3233 (33.3)	2469 (25.4)
Females 13–14 years old	3301 (41.5)	2855 (35.9)	1797 (22.6)	2275 (28.6)	2928 (36.8)	2750 (34.6)
Females 15–18 years old	2761 (33.2)	3207 (38.5)	2355 (28.3)	1558 (18.7)	3133 (37.6)	3631 (43.6)
<i>Language background</i>						
English only	29,858 (51.5)	18,259 (31.5)	9859 (17.0)	23,603 (40.7)	19,494 (33.6)	14,879 (25.7)
NESB	10,158 (56.5)	5538 (30.8)	2294 (12.8)	7584 (42.2)	6153 (34.2)	4253 (23.6)
<i>Community socio-economic position (SEIFA IRSAD)</i>						
1 (Most disadvantaged)	9253 (46.6)	6715 (33.8)	3877 (19.5)	7312 (36.8)	6916 (34.9)	5616 (28.3)
2	6433 (51.0)	4044 (32.1)	2131 (16.9)	5054 (40.1)	4223 (33.5)	3331 (26.4)
3	6284 (52.5)	3715 (31.0)	1977 (16.5)	4757 (39.7)	4169 (34.8)	3050 (25.5)
4	8749 (55.8)	4745 (30.3)	2179 (13.9)	6878 (43.9)	5095 (32.5)	3700 (23.6)
5 (Most advantaged)	9297 (58.6)	4579 (28.9)	1989 (12.5)	7185 (45.3)	5243 (33.1)	3436 (21.7)
<i>Highest education level of parents/guardians</i>						
Year 11 or equivalent or below	4427 (44.3)	3462 (34.6)	2112 (21.1)	3506 (35.1)	3484 (34.8)	3011 (30.1)
Year 12 or equivalent	4343 (48.3)	3051 (34.0)	1593 (17.7)	3365 (37.4)	3174 (35.3)	2449 (27.2)
Certificate I to IV	10,968 (50.2)	7034 (32.2)	3864 (17.7)	8677 (39.7)	7427 (34.0)	5762 (26.4)
Advanced Diploma or Diploma	5761 (52.9)	3400 (31.2)	1730 (15.9)	4431 (40.7)	3678 (33.8)	2783 (25.5)
Bachelor Degree or above	14,516 (59.9)	6850 (28.3)	2854 (11.8)	11,208 (46.3)	7884 (32.6)	5128 (21.2)
<i>Geographical remoteness (ARIA)</i>						
Major Cities of Australia	28,155 (53.3)	16,419 (31.1)	8234 (15.6)	21,747 (41.2)	17,858 (33.8)	13,204 (25.0)
Inner Regional Australia	5723 (51.5)	3512 (31.6)	1885 (17.0)	4595 (41.3)	3699 (33.3)	2827 (25.4)
Outer Regional Australia	4758 (50.6)	3000 (31.9)	1647 (17.5)	3795 (40.3)	3189 (33.9)	2421 (25.7)
Remote/Very Remote Australia	1381 (52.4)	866 (32.9)	386 (14.7)	1051 (39.9)	901 (34.2)	681 (25.9)

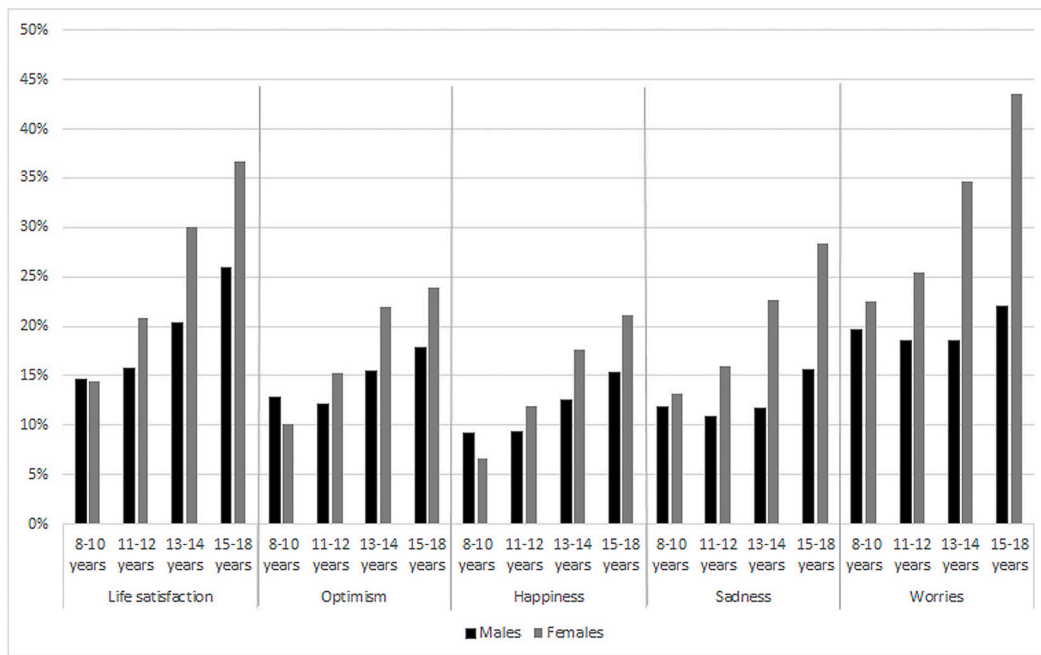
previous studies such as the Children’s World project (8–12 years) and the HSBC (11–15 years) study is likely to have contributed to differences in findings. Analyses of data from the Children’s World project among children from 15 countries found that life satisfaction increased from 8 to 10 years of age and then decreased from 10 to 12 years (Casas & González-Carrasco, 2019). Within this narrow age range (8–12 years), the observed non-linear age effects would likely correspond to a null or small age effect using a correlation coefficient. Our study confirms that life satisfaction, as well as other wellbeing indicators, show clear declines as children transition into adolescence, and these effects are more pronounced for girls than boys.

Given the known declines in wellbeing with age, pre-emptive interventions are needed to ensure that good wellbeing is maintained as children move into adolescence. Reducing the decline in wellbeing with age has the potential to help ameliorate a range of adverse life outcomes such as disengagement with school, poor academic success, school dropout and mental ill-health. Meta-analyses indicate that universal school-based programs focused on promoting social and emotional learning are effective for improving wellbeing and mental health (Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011; Goldberg et al., 2019) with some studies also reporting positive impacts on academic outcomes (Durlak et al., 2011). Analysis of pooled effect sizes has demonstrated that implementation quality is fundamental for improving the effectiveness of school-based programs (Durlak et al., 2011) accordingly, there is a need for attention to teacher training and self-efficacy, stakeholder buy-in, and implementation fidelity when researching and delivering school-based programs (Goldberg et al.,

2019). Further, there is a need to better understand the “active ingredients” of school-based wellbeing programs that are most robustly linked to improved outcomes, and to determine whether these programs can be used to reduce the incidence of childhood-onset mental health problems. While schools are uniquely positioned to support student wellbeing and mental health it is also important to acknowledge that many factors impacting child and adolescent wellbeing, such as parent-child relationships, parental mental health, housing insecurity and financial hardship are outside of schools’ control and need to be supported with universal and targeted responses external to the education system.

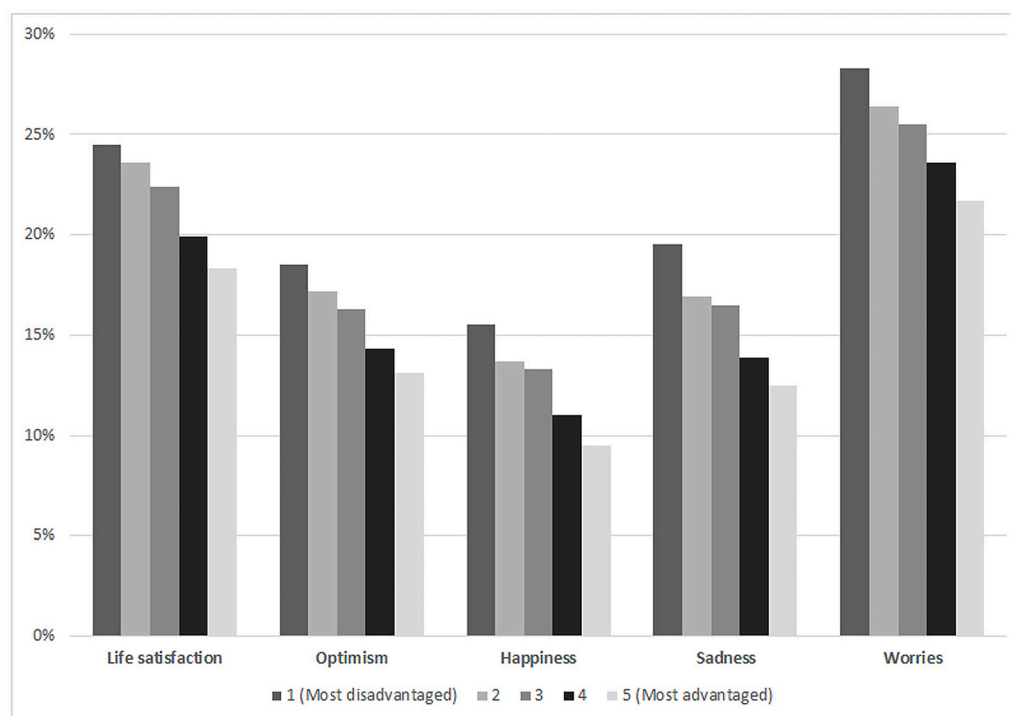
Ongoing population monitoring provides crucial infrastructure to enable tracking of progress over time in promoting wellbeing for all and reducing inequalities among sub-populations who bear a disproportionate burden of mental ill-health. The Sustainable Development Agenda has included focus on the promotion of mental health and wellbeing in target 3.4, though the indicator against which the world is tracking progress toward this target is simply a country’s suicide mortality rate. This does not provide the information required to understand and thus promote the wellbeing of populations. The model used in the WEC offers a potential measurement solution that is not only comprehensive in monitoring both positive and negative aspects of wellbeing, but scalable through implementation in education systems.

While this study has a number of strengths, one key limitation is that children attending non-government schools (Catholic and Independent) schools were excluded from the analysis because socio-demographic characteristics could not be linked to their WEC results. Children who



Notes. Percentage of children and adolescents with *low* life satisfaction, optimism, and happiness, and *high* sadness and worries.

Fig. 2. Age gradient in social and emotional wellbeing by gender.



Notes. Percentage of children and adolescents with *low* life satisfaction, optimism, and happiness, and *high* sadness and worries. Groups (bars) represent the socio-economic position of the community where the child resides based on SEIFA IRSAD ranging from 1 = most disadvantaged communities to 5 = most advantaged communities.

Fig. 3. Socio-economic gradient in social and emotional wellbeing.

attend non-government schools in Australia tend to live in more socio-economically advantaged communities compared to children who attend government schools (Bonner & Shepherd, 2017), leading to an under representation of children from the most affluent communities in the analysis sample. In addition, there was some bias from within the

government school sector, with children from more socio-economically disadvantaged backgrounds under-represented in the analysis sample. Taken together, this is likely to have led to an underrepresentation of children at both the most and least disadvantage end of the socio-economic spectrum, and this may have led to an underestimate of

the magnitude of socio-economic inequalities in wellbeing outcomes. The collection of socio-demographic information from all non-government children who participate in the WEC in future collection waves would help to ensure that the WEC data is more representative of all children across the socio-economic spectrum.

4.1. Future directions

The current study found an overall decline in wellbeing with age using cross-sectional data. However, trajectory modelling of longitudinal data suggests that there are groups of children with different trajectories over time with some students maintaining low levels of sadness during the transition from childhood to adolescents (Brendgen, Wanner, Morin, & Vitaro, 2005; D.; Gregory, Turnbull, Bednarz, & Gregory, 2020). Investigating the variation in wellbeing trajectories over time, particularly over the important transition from primary school to high school, is an important future direction for this research. Understanding the risk and protective factors for more favourable wellbeing trajectories would also be helpful to inform prevention and early intervention strategies.

4.2. Conclusions

The current study suggests that a sizable proportion of children and adolescents experience poor wellbeing during their schooling years. The prevalence of poor wellbeing increases with age, particularly for female students, and children from families with a lower socio-economic position are disproportionately impacted by low wellbeing. While clinical, individual-level responses to acute mental health crises are essential, we argue that the prevalence of low wellbeing suggests that broader population-level preventative health approaches are also needed. The collection of comprehensive wellbeing data through education systems over time provides a mechanism to monitor and track outcomes and to evaluate whether interventions and policy changes can make a difference.

Author statement

Tess Gregory: Conceptualization, Methodology, Formal analysis, Writing – Original Draft, Writing – Review & Editing, Funding acquisition. **Alanna Sincovich:** Writing – Original Draft, Writing – Review & Editing. **Mary Brushe:** Writing – Original Draft, Writing – Review & Editing. **Amy Finlay-Jones:** Writing – Original Draft, Writing – Review & Editing. **Luke R. Collier:** Formal analysis, Writing – Original Draft, Writing – Review & Editing. **Blair Grace:** Data Curation, Writing – Review & Editing. **Neida Sechague Monroy:** Data Curation, Writing – Original Draft, Writing – Review & Editing. **Sally A. Brinkman:** Conceptualization, Methodology, Writing – Review & Editing, Funding acquisition.

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Ethical approval

Ethics approval was received from the University of Western Australia (RA/4/20/6095). Data linkage was conducted by the South Australian DfE who provided a de-identified data file to the researchers

for analysis.

Declaration of competing interest

We declare no conflict of interest.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ssmph.2021.100907>.

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